Physical Chemistry-Properties of Gases

Name of a student -------------------- Signature -------------------- No. -----------

University of Mustansiriyah — 1st Semester-2021

Department of Chemistry — 1st Exam-paper B

Q1: Circle the right answer for all of the following: (50 degree)

1: Carbon dioxide is classified as a .
Answer: a) toxic gas   b) ideal gas   c) real gas   d) heavy gas

2: A 2 dm^3 container contains a certain amount of gas at 0.5 atm pressure. The gas is transferred to another vessel of volume and the pressure is 0.25 bar. What should be it is Volume?
Answer: a) 0.40 atm   b) 0.40 dm^3 c) 0.4 bar   d) 4 bar

3: A gas occupies 400 dm^3 at 130 °C and 76 cmHg pressure. What would be it is volume at STP?
Answer: a) 270 L   b) 207 dm^3 c) 207 m^3 d) 204 cm^3

4: Calculate the weight of H_2 (2.00 g.mol^{-1}) in a 2 L cylinder at 2.5 atm and 27 °C.
Answer: a) 0.40 mol^{-1} b) 0.40 g   c) 0.40 mol g^{-1} d) 0.4 g mol^{-1}

5: Calculate the number of moles for CO_2 in a 10 L cylinder at 8 bar and 27 °C.
Answer: a) 3.25 mmol   b) 3.00 mol   c) 3.00 L   d) 2.99 mol

6: According to Graham's law the lightest gas is?
Answer: a) H_2 b) O_2 c) N_2 d) CO_2

7: According to the Boyle's law the pressure of a gas is inversely proportional with?
Answer: a) mol   b) T   c) R   d) V

8: If a gas has Vm ≠ V°m then this means one of the following?
Answer: a) real   b) noble   c) ideal   d) heavy

9: If RT > pV this means the forces dominated are?
Answer: a) attraction   b) repulsion   c) Van der Waal's   d) no one of these

10: According to Gay-Lussac's law the volume of the gas is?
Answer: a) constant   b) variable   c) equal to zero   d) equal to 22.4 L

Q2: Under the same conditions of temperature and pressure, how many times faster will hydrogen effuse compare to carbon dioxide. (25 degree)

Q3: Calculate the density of carbon dioxide (44 g mol^{-1}) at STP. (25 degree)

Wed_20/01/2021   Best wishes   Dr Abduljabbar I. R. Rushdi

Q:2:

Solution :-

$$\frac{r_{H_2}}{r_{CO_2}} \sqrt{\quad} = \sqrt{\frac{M_{CO_2}}{M_{H_2}}}$$

$Q_2 \frac{25}{26}$

$$\frac{r_{H_2}}{r_{CO_2}} = \sqrt{\frac{44 \ g/mol}{2.00 \ g/mol}} = \sqrt{22} = 4.6 \quad H_2 \ effuse \ compart \ CO_2$$

Q:3:

Solution :-

$$d = \frac{PM}{RT}$$

in STP

then $P = 1 \ atm$

$T = (0°C + 273.15) = 273.15 \ K$

$R = 0.082 \ L \cdot atm \cdot K^{-1} \cdot mol^{-1}$

$Q_3 \frac{25}{25}$

$$d = \frac{(1 \ atm)(44 \ g \ mol^{-1})}{(0.082 \ L \cdot atm \cdot K^{-1} \cdot mol^{-1})(273.15 \ K)} = \frac{44 \ g}{22.4 \ L} = 1.96 \quad g/L$$

then :- $1.96 = density \ of \ CO_2$